

STS-110: A framework for station expansion

The Space Shuttle *Atlantis* will begin expanding the International Space Station on STS-110, installing the initial section of a framework that eventually will hold systems needed to provide power and cooling for future international research laboratories.

Scheduled to launch no earlier than April 4, *Atlantis*' mission will be one of the most complex station assembly flights to date, including four space walks and operations with both the shuttle's robotic arm and the station's robotic arm. During the space walks, astronauts will truly take on the appearance of high-rise construction workers as they assemble beams, attach work lights, bolt girders and plug in electrical connections.

For the first time, the station's Canadarm2 robotic arm will be used exclusively to hoist the 13-ton truss section, called the S0 Integrated Truss Structure, from *Atlantis* and attach it to the station. Other firsts also will be apparent: The first use of the station arm as a space "cherry picker" to maneuver space walkers and the first shuttle flight to have all space walks originate from the station's airlock.

The *Atlantis* crew will be comprised of:

Commander

Michael J. Bloomfield, 43, Lt. Col., USN – Third space flight

Pilot

Stephen N. Frick, 37, Lt. Cmdr., USN – First space flight

Mission Specialist 1

Rex J. Walheim, 39, Lt. Col., USAF – First space flight

Flight Engineer and Mission Specialist 2

Ellen Ochoa, 43 – Fourth space flight

Mission Specialist 3

Lee M. E. Morin, 49 – First space flight

Mission Specialist 4

Jerry L. Ross, 54 – Making a record seventh flight aboard the shuttle, the most of any astronaut in history

Mission Specialist 5

Steven L. Smith, 43 – Fourth space flight

Smith and Walheim will form one team of space walkers while

Ross and Morin will form a second spacewalking team.

Assisting with *Atlantis*' assembly work from aboard the ISS will be the current station residents, the Expedition 4 crew of Commander Yuri Onufrienko and Flight Engineers Dan Bursch and Carl Walz. The station crew has been aboard the complex since early December.

Atlantis will carry the first major external truss section for the station, a 43-foot long girder-like segment that will lay the foundation for an eventual cross-beam that will stretch more than 350 feet. Nine additional truss segments will be linked on future missions to the centerpiece segment carried by *Atlantis* to form the finished structure.

The finished truss will support almost an acre of solar panels and giant cooling radiators. Although the ISS already is a fully functional research complex with a single United States laboratory, the additional solar panels and radiators will provide the electricity and cooling necessary for Japanese and European laboratories to be attached to the station, as well as a future U.S. centrifuge laboratory.

The truss segment carried to the station by *Atlantis* also will include the first space railroad. Attached to the truss before launch will be a space railcar called the Mobile Transporter and a section of track that will span the length of the truss segment. The Mobile Transporter, when it is coupled with a base system for the station's Canadian robotic arm later this year, will allow the station's robotic arm to ride up and down the length of the football-field long finished truss. The rail system will allow the arm to be positioned wherever it may be needed along the truss for maintenance or assembly work in the future. ♦

Behind the scenes with . . . Dina Barclay, Lead EVA Officer for STS-110, 8A

By Melissa Davis

Q How long have you been the lead EVA (Extravehicular Activity, or space walk) Officer?

A I was assigned as the lead EVA officer for 8A around May of last year, although I have been working this flight on and off for about three years. I've been in the EVA MOD group for about six years after coming from the Training Division in MOD (Data Processing System and Navigation). I started learning the spacesuit and Shuttle airlock, certifying as a spacesuit instructor, and then moved on to learning the Shuttle exterior, payloads and the International Space Station exterior as an EVA task instructor. I then spent several months in Russia as an EVA liaison, and in May I was fortunate enough to be given this opportunity.

Q How long has the crew trained with you for this mission?

A The crew started training last year. The instructors on our team that really perform the detailed crew training are Michelle Hollinger, the lead EVA task instructor for the S0 element and ISS exterior, and Zeb Scoville, the lead spacesuit and airlock instructor.

Q What are some of the elements of their training?

A They have been hung from the ceiling, dunked under water in spacesuits, taken to vacuum in a JSC airlock and flown around the Space Station in virtual reality. They've also performed numerous tests involving the S0 element at KSC, they've spent time learning the intricacies of EVA tools and they've been riding on top of robotic arms at the Neutral Buoyancy Laboratory. Their training is varied to give them the best possible collective experience on the ground that can simulate working in space.

Q What are some challenges you will face with this mission?

A The biggest challenges involve the structural attach system of S0, and the time criticality of electrically mating the connectors before S0 gets too cold on the first EVA.

The S0 truss element is the central truss element, and it will be the mechanical 'anchor' to the US Lab for the entire truss at ISS assembly complete. There are four deployable, telescoping groups of struts (two of the groups are similar to a large camera tripod). These four strut groups form a rigid attach system between the truss and the Lab. They must be deployed via EVA, and the installation of the bolts that hold them in place is critical for further station assembly.

Also, like other ISS missions, the S0 truss element could get too cold after removal from the Shuttle payload bay and before heater power can be applied to it. As such, we must deploy trays of cables and mate several critical cables to get the heater power applied to it. If anything goes wrong with the as-planned trays or the cables, we have some backup cables we can deploy, but it all must be done on the first EVA.

Q What should readers keep in mind and be on the lookout for when following this particular mission?

A On the crew are two of the most experienced space walkers in the astronaut office, and they've been paired up with two well-trained and ready-to-fly new space walkers. These guys might make the EVAs look easy. Don't be fooled; completing a complicated mission like this isn't easy.

Q What interesting behind-the-scenes activity is going on with this mission that readers might be surprised to know?

A Two of the EV crew members are grandfathers. Guess which ones? Give up? Lee Morin and Jerry Ross.